

# PATENT ABSTRACTS OF JAPAN

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(71)Applicant.: YOSHINO SEKKO KK

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(72)Inventor : WATANABE TAKUYA

YONEZAWA SHINJI

NAKAMURA WATARU

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## (54) CELLULAR PLASTERBOARD

### (57)Abstract:

PROBLEM TO BE SOLVED: To obtain a lightweight plasterboard having adhesive property to paper and improved in strength in which interminglement of fine air cells in the core of the plasterboard is repressed to the utmost and comparatively large and uniform air cells are spread out in the core, by containing air cells and a foam-adjusting agent in the core gypsum material of the plasterboard.

SOLUTION: The foam-adjusting agent for this plasterboard is a compound having a defoaming or foam-destroying effect and especially preferably an iron sulfate compound or an aluminum sulfate compound. Adjustment of a quantity of this foam-adjusting agent leads to capability of almost controlling the size of air cells in a gypsum slurry and the quantity is preferably 0.001 to 0.01 pts.wt. in the case of a defoaming agent and 0.1 to 0.5 pts.wt. in the case of a foam-destroying agent, each based on 100 pts.wt. of core calcined gypsum. The foam-adjusting agent is projected into a mixer just as it is or in a diluted state with water in the case where the agent is in a liquid state, and singly or in a mixed state with calcined gypsum, after finely granulated, in the case where the agent is in a solid state.

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L1: Entry 2 of 2

File: DWPI

Dec 15, 1998

DERWENT-ACC-NO: 1999-100945

DERWENT-WEEK: 199909

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TITLE: Cellular plastic board for building construction - contains core material incorporated with air and foaming agent

PATENT-ASSIGNEE:

ASSIGNEE	CODE
YOSHINO SEKKO KK	YOSHNN

PRIORITY-DATA: 1997JP-0099571 (April 3, 1997)

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PATENT-FAMILY:

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APPLICATION-DATA:

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INT-CL (IPC): C04B 28/14; C04B 38/10

ABSTRACTED-PUB-NO: JP 10330174A

BASIC-ABSTRACT:

NOVELTY - The board consists of core material formed by combining air bubble and foaming agent.

USE - For building construction.

ADVANTAGE - Improves adhesive property and is light weight in nature.

CHOSEN-DRAWING: Dwg.1/4

TITLE-TERMS: CELLULAR PLASTIC BOARD BUILD CONSTRUCTION CONTAIN CORE MATERIAL INCORPORATE AIR FOAM AGENT

DERWENT-CLASS: L02

CPI-CODES: L02-D15B;

SECONDARY-ACC-NO:  
CPI Secondary Accession Numbers: C1999-030054

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(71)出願人 000160359

吉野石膏株式会社  
東京都千代田区丸の内3丁目3番1号 新  
東京ビル内

(72)発明者 渡辺 阜也

福岡県北九州市若松区響町一丁目103-2  
吉野石膏株式会社北九州工場内

(72)発明者 米沢 慎二

福岡県北九州市若松区響町一丁目103-2  
吉野石膏株式会社北九州工場内

(72)発明者 中村 渉

東京都足立区江北2-1-1 吉野石膏株  
式会社技術研究所内

(74)代理人 弁理士 吉田 勝広 (外1名)

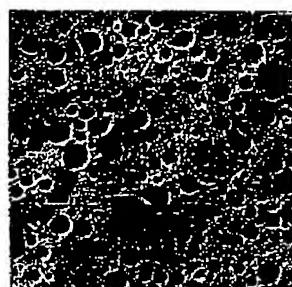
(54)【発明の名称】 気泡入り石膏ボード

(57)【要約】

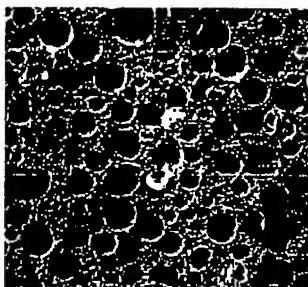
【課題】 石膏ボードのコア中に微細な気泡が混在するのを極力抑え、比較的大きな一様の気泡をコア中に散在せしめ、原紙に対する接着性を有し且つ強度の向上した軽量な石膏ボードを提供すること。

【解決手段】 石膏ボードを構成する芯材中に、気泡と整泡剤とが混在していることを特徴とする気泡入り石膏ボード。

実施例2



実施例4



## 【特許請求の範囲】

【請求項1】 石膏ボードを構成する芯材中に、気泡と整泡剤とが混在していることを特徴とする気泡入り石膏ボード。

【請求項2】 整泡剤が、消泡効果又は破泡効果を有する物質である請求項1に記載の気泡入り石膏ボード。

【請求項3】 整泡剤が、多価金属の硫酸塩化合物である請求項1に記載の気泡入り石膏ボード。

【請求項4】 多価金属が、鉄又はアルミニウムである請求項3に記載の気泡入り石膏ボード。

【請求項5】 整泡剤の混在量が、芯材を構成する焼石膏100重量部当たり0.001~1.0重量部である請求項1に記載の気泡入り石膏ボード。

【請求項6】 整泡剤の混在量が、起泡剤100重量部当たり0.5~5.000重量部の範囲である請求項1に記載の気泡入り石膏ボード。

【請求項7】 厚み9.5mm及び密度6.8~7.2g/cm<sup>3</sup>において、曲げ破壊荷重(N)縦/横が、485~570/195~220であり、且つ厚み12.5mm及び密度6.6~7.0g/cm<sup>3</sup>において、曲げ破壊荷重(N)縦/横が、600~650/275~310である請求項1に記載の気泡入り石膏ボード。

【請求項8】 厚み9.5mm及び密度6.8~7.2g/cm<sup>3</sup>において、押抜強度(kgf)・湿潤が25~35であり、且つ厚み12.5mm及び密度6.6~7.0g/cm<sup>3</sup>において、押抜強度(kgf)・湿潤が30~40である請求項1に記載の気泡入り石膏ボード。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、原紙に対する接着性を有し且つ強度の向上した軽量な気泡入り石膏ボードに関する。

## 【0002】

【従来の技術】石膏系建築材料の代表的なものに石膏ボードがある。かかる石膏ボードは、通常、焼石膏、接着剤、種々の添加剤及び水と、軽量化を図るために予め発泡させた泡とをミキサーで混練し、得られるスラリーを上下の原紙間に流し込み、次いで、厚みや幅を決定する成型機を通過させ、硬化後粗切断して強制乾燥機を通して、かかる後に、製品寸法に裁断して製造される。つまり、石膏ボードは、流し込み成形法により得られる石膏芯(コア)を原紙で被覆してなる板状構造体であって、防耐火性、遮音性、施工性及び経済性等の優れた性能を有する。

【0003】上記性能ゆえに、石膏ボードは、一般住宅や低・中層建築物に留まらず、近年では、急速に普及している高層・超高層建築物等の内装材として広く使用されるようになっており、工程的適合性、建築物の軽量化、搖れに対する追随性等に優れた特性を有することが

認められている。その軽量化を担う石膏ボードの軽量性は、主として石膏芯材のボリュームを構成する石膏量と泡空隙量によって左右され、石膏量を減少せしめる程、つまり、泡空隙量の占める割合を増加せしめることにより石膏ボードの軽量化が図れる。しかしながら、石膏量の減少はコア(芯)の強度を低下せしめ、引いては原紙との接着不良を招き、商品価値の無いものとなるので、おのずと石膏の使用量は決まり、石膏ボードの重量は限定されてきている。

10 【0004】このことから、石膏コアの強度を維持したまま、軽量化を図る石膏ボードとその製造に関する研究が為されてきており、その点、コア中に混在せしめる泡空隙(気泡)の形状については、従来は、石膏コア中に多数の小さな気泡を生成させる研究が主流をなしていたが、最近では、米国特許第5,085,929号明細書に開示されているように、逆に比較的大きな独立気泡を石膏コア中に混在せしめることにより、前記目的を達成できるとする改良技術が提案されており、このようにコア中に比較的大きな気泡を混在せしめることが、石膏ボードの軽量化における最近の傾向となっている。

## 【0005】

【発明が解決しようとする課題】その点、米国特許第5,240,639号明細書に開示されている安定した気泡が得られる起泡剤を用い、更には発泡装置を検討し採用すると、確かに泡発生直後の気泡は比較的大きな空ましい形状となる。しかしながら、ミキサー内における焼石膏、水、添加剤、気泡等からなるスラリーの滞留時間は僅か数秒程度と短いために、ミキサーから連続して排出されるスラリーの練り状態を良好にするためには、

20 ミキサーには高い攪拌力が要求されており、かようなミキサー内に投入される気泡は、投入前に所定の泡沫を有していても、それらは一部が破泡することになる。

【0006】そして、使用する起泡剤が高性能に確立されていることから、更には、破泡した起泡剤がミキサーの高攪拌力によって再発泡し、投入する気泡とは異なる形態で維持され、得られる石膏ボードのコア中には連通孔や微細な気泡等が多数混在することになり、原紙に対する接着性を保ち且つコアの強度を維持したまま、石膏ボードの軽量化を図ることができなかった。又、このことは、ピンミキサーの使用に限らず、米国特許4,176,972号明細書に開示される「同軸ポンプミキサー」を使用する等、ミキサーを種々変更しても、前記と同様であって石膏ボードの軽量化が充分には図れなかつた。従って本発明の目的は、石膏ボードのコア中に微細な気泡が混在するのを極力抑え、比較的大きな一様の気泡をコア中に散在せしめ、原紙に対する接着性を有し且つ強度の向上した軽量な石膏ボードを提供することにある。

## 【0007】

【課題を解決するための手段】上記目的は以下の本発明

によって達成される。即ち、本発明は、石膏ボードを構成する石膏芯材中に、気泡と整泡剤とが混在していることを特徴とする気泡入り石膏ボードである。本発明者等は、前記課題を鑑みて鋭意研究したところ、整泡剤として消泡効果又は破泡効果を有する化合物をスラリー中に添加することにより、スラリー中の微細な気泡群同士の結合が促進され、瞬時に大きな気泡を形成し、且つ該化合物の発泡抑制作用によってミキサー内で破泡して生じた起泡剤が、攪拌中に再発泡するのを抑え、コア中に均一で大きな気泡を得ることが可能となり、原紙に対する接着性を有し且つ強度の向上した軽量な石膏ボードが得られるとの知見を得て本発明を完成した。

## 【0008】

【発明の実施の形態】次に好ましい実施の形態を挙げて本発明を更に詳しく説明する。本発明においていう整泡剤とは、消泡効果又は破泡効果を有する化合物を意味し、消泡効果を有する化合物には、一般にいう消泡剤、即ち高級脂肪酸誘導体等の有機系化合物、アルコール類、シリコーン油、パラフィン等に加えて、これらを使用して完成した水硬性物質（石膏或いはセメント類）製品、或いはその廃材粉末、及びペースト類等が挙げられる。又、破泡効果を有する化合物としては、多価金属の硫酸塩化合物、例えば、マンガン及び鉄を代表とする遷移金属の硫酸塩化合物の他、マグネシウム、亜鉛、アルミニウム等の2価以上の金属の硫酸塩化合物が挙げられる。これらのなかで特に好ましいものは鉄又はアルミニウムの硫酸塩化合物である。

【0009】以上の如き整泡剤の使用量を調整することにより、石膏スラリー中の気泡の大きさをおおむねコントロールすることが可能であり、その使用量は特に限定されないが、多量に使用した場合は消泡能力又は破泡能力が優り、従来より多量の起泡剤を必要とするために、コストアップになり現実的ではなく、一般には、消泡剤の場合は焼石膏100重量部当たり0.5重量部以下、破泡剤の場合は1.0重量部以下の範囲であり、消泡剤の場合は好ましくは0.001～0.01重量部、破泡剤の場合は好ましくは0.1～0.5重量部の範囲である。更に、起泡剤に対しては、起泡剤100重量部当たり消泡剤の場合は0.5～5.0重量部、好ましくは1.0～5.0重量部、破泡剤の場合は200～5,000重量部、好ましくは500～2,000重量部の範囲である。

【0010】尚、前記化合物を含む水硬性物質を整泡剤として使用するときは、それに含まれる消泡効果又は破泡効果のある化合物の量が対象になることは勿論のことである。又、整泡剤をミキサー内に投入するときは、液\*

## 実施例1

整泡剤：脂肪酸誘導体（ミヨシ油脂製、商品名トリミン）	0.01重量部
起泡剤：アルキルエーテル硫酸塩（東邦化学製）	0.03重量部

## 実施例2

\*状であれば、そのまま若しくは希釈して単独又は水等の他の液状に加えて投入することができる。又、整泡剤が固形状であるときは、粒状とし（その粒径は微細であることが望ましい）、単独若しくは焼石膏等の粉状物に加え、ミキサー内に投入できる。

【0011】本発明の石膏ボードの製造方法は、以上のように特定量の整泡剤を使用する以外は従来の公知の石膏ボードの製造方法と実質的に変わることはない。即ち、焼石膏、接着剤、種々の添加剤及び水と、軽量化を図るために予め発泡した泡とをミキサーで混練し、得られるスラリーを上下の原紙間に流し込み、次いで、厚みや幅を決定する成型機を通過させ、硬化後粗切断して強制乾燥機を通り、かかる後に、製品寸法に裁断して製造される。

【0012】以上の如くして得られる本発明の石膏ボードは、例えば、厚み9.5mm及び密度6.8～7.2g/cm<sup>3</sup>において、曲げ破壊荷重（N）縦／横が、485～570/195～220であり、且つ厚み12.5mm及び密度6.6～7.0g/cm<sup>3</sup>において、曲げ破壊荷重（N）縦／横が、600～650/275～310という物性を有している。又、厚み9.5mm及び密度6.8～7.2g/cm<sup>3</sup>において、押抜強度（kgf）・湿潤が25～35であり、且つ厚み12.5mm及び密度6.6～7.0g/cm<sup>3</sup>において、押抜強度（kgf）・湿潤が30～40という物性を有している。上記における物性値は後述の試験方法に基づく。

## 【0013】

【実施例】次に実施例及び比較例を挙げて本発明を更に具体的に説明する。

## 実施例1～8

焼石膏100重量部、水85重量部、減水剤0.3重量部、メチルセルローズ1重量部及び硬化促進剤3.0重量部に、それぞれ下記記載の整泡剤（消泡剤又は破泡剤）と起泡剤とを慣用のピンミキサーを用いて混練したスラリーを使用して、常法により石膏ボードを製造した。製造した石膏ボードの曲げ破壊荷重と押抜強度を下記表1に示す。各整泡剤の使用量は焼石膏100重量部当たりの重量部を示す。尚、実施例3と4、及び実施例7と8とは、構成成分は同一の内容であるが、製造した石膏ボードの密度が異なるものである。又、泡の発泡は、特開昭63-45186号公報に開示されている装置を用いて行ない、各試験はそれぞれ同様の気泡を得て実施した。

## 【0014】

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整泡剤：シリコンエマルジョン（東芝シリコーン製）  
起泡剤：アルキルエーテル硫酸塩（東邦化学製）

0.01重量部  
0.03重量部

【0015】

実施例3

整泡剤：撓水性石膏ボードの粉末（註1）  
起泡剤：アルキルエーテル硫酸塩（東邦化学製）  
註1）撓水性石膏ボード中の撓水剤はパラフィンエマルジョンで、使用量は焼石膏100重量部に対して3重量部である。

実施例4

整泡剤：実施例3と同じ  
起泡剤：実施例3と同じ

【0016】

実施例5

整泡剤：硫酸バンド（大明化学製）  
起泡剤：アルキルエーテル硫酸塩（東邦化学製）

0.3重量部  
0.05重量部

実施例6

整泡剤：硫酸第二鉄（試薬一級）  
起泡剤：アルキルエーテル硫酸塩（東邦化学製）

0.2重量部  
0.05重量部

【0017】

実施例7

整泡剤：硫酸第二鉄（日鉄鉱業製、ポリテツ）  
起泡剤：アルキルエーテル硫酸塩（東邦化学製）

0.5重量部  
0.05重量部

実施例8

整泡剤：実施例7と同じ  
起泡剤：実施例7と同じ

【0018】比較例1～8

焼石膏100重量部、水85重量部、減水剤0.3重量部、メチルセルローズ1重量部及び硬化促進剤3.0重量部を慣用のピンミキサーを用いて混練したスラリーを使用して、通常の製造方法に基づいて石膏ボードを製造した。製造した石膏ボードの曲げ破壊荷重と押抜強度を\*

\*下記表1に示す。尚、所定の密度を得るために、実施例と同様に起泡剤としてアルキル硫酸塩（東邦化学（株）製）0.05重量部を用いて、特開昭63-45186号公報に開示する装置を用い発生させた泡を混合した。

【0019】

【表1】表1：物理性能

		厚み (mm)	密度 (g/cm <sup>3</sup> )	曲げ破壊荷重 (N)	押抜強度 (kgf) 乾燥／湿潤 (註2)
実施例	1	9.5	0.70	559/210	47/31
	2	9.5	0.68	488/194	41/29
	3	12.5	0.69	645/302	57/37
	4	12.5	0.66	600/280	47/32
	5	9.5	0.74	609/244	50/37
	6	9.5	0.68	492/196	42/29
	7	12.5	0.69	654/299	56/36
	8	12.5	0.65	591/270	49/28
比較例	1	9.5	0.72	480/191	42/24
	2	9.5	0.70	455/178	38/23
	3	12.5	0.69	596/235	44/26
	4	12.5	0.67	564/225	43/24
	5	9.5	0.75	525/210	43/28
	6	9.5	0.70	455/178	38/23
	7	12.5	0.69	596/245	44/26
	8	12.5	0.66	556/235	41/23

【0020】註2：ここで湿潤とは、一般的な使用条件を鑑み、室温25°C、相対湿度85%の雰囲気で3時間養生した後の測定結果である。尚、実施例1～8及び比較例1～8のそれぞれの石膏ボードにおけるコアと原紙との接着はいずれも良好であった。接着性試験は、「JISA6901-1983 せっこうボード」に規定されている接着性試験により測定した。曲げ破壊荷重は、「JISA6901-1994 せっこうボード」に規定されている曲げ試験により測定した。押抜強度は、ASTM規格C473-92「せっこうボード製品類及びせっこうラスボードの物理試験の標準試験方法」に規定されている釘の引き抜き抵抗試験方法により測定した。

【0021】尚、実施例2、実施例4、実施例6、実施例8、比較例2、比較例4、比較例6及び比較例8で得られた石膏ボードの断面のSEM写真（倍率100）を撮影して図1～4に示した。尚、他の実施例及び比較例の断面は図1～4と同様であった。前記表1、図1～4から、本発明によって得られた石膏ボードはコア中に均\*

\*一な泡空隙を有していることが明らかである。しかも、30 同一規格（厚み、密度）基準においては、強度等が向上し、原紙に対する接着性を有し且つ物理特性を維持したまま、製品の軽量化を図り消費者のニーズに応えることが可能となる。

#### 【0022】

【発明の効果】本発明によれば、起泡剤の種類や使用するミキサー等に左右されず、石膏ボードのコア中に微細な気泡が混在するのを極力抑え、比較的大きな一様の独立気泡を散在せしめ、原紙に対する接着性を有し且つ強度の向上した軽量な石膏ボードが得られ、消費者のニーズに応えることが可能となった。

#### 【図面の簡単な説明】

【図1】 実施例2及び4のコア中の泡空隙を示す図

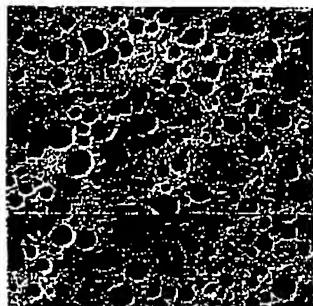
【図2】 実施例6及び8のコア中の泡空隙を示す図

【図3】 比較例2及び4のコア中の泡空隙を示す図

【図4】 比較例6及び8のコア中の泡空隙を示す図

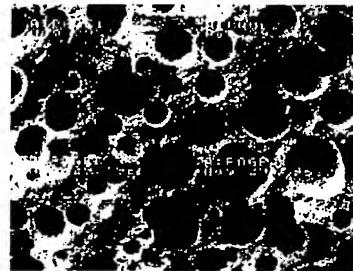
【図1】

実施例2



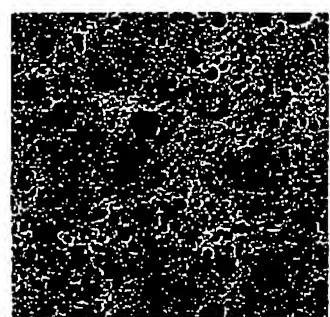
【図2】

実施例6

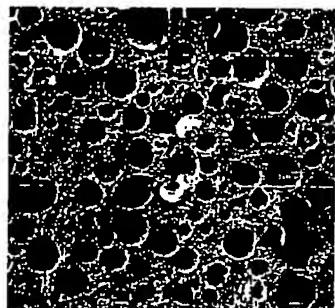


【図3】

比較例2



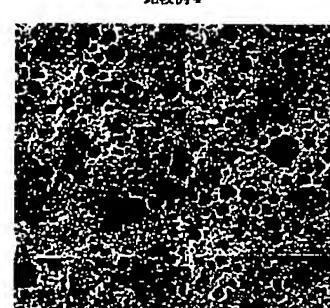
実施例4



実施例8

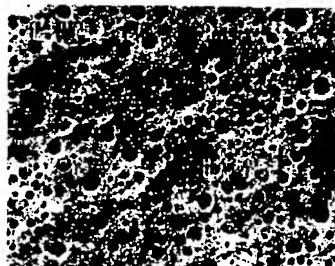


比較例4



【図4】

比較例6



比較例8



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- 2.\*\*\*\* shows the word which can not be translated.
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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the cellular lightweight entering plaster board whose reinforcement has an adhesive property over stencil paper, and improved.

[0002]

[Description of the Prior Art] Plaster board is one of the typical things of a gypsum-fibrosum system building material.. This plaster board kneads the bubble made to foam beforehand in order to usually attain exsiccated gypsum, adhesives, various additives and water, and lightweight-ization by the mixer, slushes it between the stencil paper of the upper and lower sides of the slurry obtained, subsequently it passes the briquetting machine which determines thickness and width of face, is after [hardening] - rough-cut, cuts out a forced drying machine through and after an appropriate time at a product dimension, and is manufactured. That is, plaster board is a platy structure object which comes to cover with stencil paper the gypsum-fibrosum heart (core) obtained by the casting fabricating method, and has the engine performance which was [ economical efficiency / fire-resistive nature, insulation, workability, ] excellent.

[0003] Having the property which the above-mentioned engine performance, therefore plaster board did not stop at the general residence, or low and a medium-rise building, but was widely used in recent years as interior material, such as upper layers, a highrise building, etc. which has spread quickly, and was excellent in the imitation nature to lightweight-izing of process-compatibility and a building and a shake etc. is admitted. The lightweight nature of the plaster board which bears the lightweight-ization can attain lightweight-ization of plaster board by making the rate that the amount of bubble openings occupies increase, so that it is influenced by the amount of gypsum fibrosum and the amount of bubble openings which mainly constitute the volume of a gypsum-fibrosum core material and makes the amount of gypsum fibrosum decrease that is,. However, since reduction of the amount of gypsum fibrosum becomes what causes an adhesive agent with stencil paper and does not have commodity value if it makes the reinforcement of a core (heart) fall and lengthens it, naturally, the amount of the gypsum fibrosum used is decided and the weight of plaster board is limited.

[0004] Although the research which makes many small air bubbles generate in a gypsum core was making the mainstream conventionally about the configuration of the bubble opening (air bubbles) you succeed in the research on the plaster board which attains lightweight-ization, and its manufacture, with the reinforcement of a gypsum core maintained, and make it intermingled in the point and a core from this Recently, as indicated by the U.S. Pat. No. 5,085,929 specification Conversely, by making it a comparatively big closed cell intermingled in a gypsum core, the amelioration technique to which it is supposed that said purpose can be attained is proposed, and it has become the latest inclination in lightweight-izing of plaster board that you make it. comparatively big air bubbles intermingled in a core in this way.

[0005]

[Problem(s) to be Solved by the Invention] In that respect, if foaming equipment is further examined and adopted using the frothing agent with which the stable air bubbles currently indicated by the U.S. Pat. No. 5,240,639 specification are obtained, surely the air bubbles immediately after bubble generating will serve as a desirable, comparatively big configuration. however, the residence time of the slurry which consists of the exsiccated gypsum in a mixer, water, an additive, air bubbles, etc. is slight -- in order to make good the

kneading condition of about several seconds and the slurry continuously discharged from a mixer since it is short, the high churning force requires of a mixer -- having -- \*\*\*\* -- \*\* -- even if the air bubbles thrown in in a mixer [ like ] have predetermined foam before the injection, a part will carry out foam breaking of them. [0006] And lightweight-ization of plaster board was not able to be attained, intermingling many free passage holes, detailed air bubbles, etc., and maintaining the adhesive property over stencil paper into the core of the plaster board with which a recurrence bubble is carried out, and the frothing agent which carried out foam breaking is maintained with a different gestalt from the air bubbles to throw in, and is further obtained from the frothing agent to be used being established by high performance according to the high churning force of a mixer, and maintaining the reinforcement of a core. Moreover, even if this changed various mixers, it was the same as that of the above, and lightweight-ization of plaster board was not fully able to plan it, such as using the "coaxial pump mixer" indicated by not only use of a pin mixer but the U.S. Pat. No. 4,176,972 number specification. Therefore, the purpose of this invention is to offer the lightweight plaster board whose reinforcement stop that detailed air bubbles are intermingled in the core of plaster board as much as possible, make uniform, comparatively big air bubbles scattered in a core, and has an adhesive property over stencil paper, and improved.

[0007]

[Means for Solving the Problem] The above-mentioned purpose is attained by the following this inventions. That is, this invention is cellular entering plaster board characterized by intermingling air bubbles and a foam stabilizer in the gypsum-fibrosum core material which constitutes plaster board. this invention person etc. by adding in a slurry the compound which has the defoaming effectiveness or a foam breaking effect as a foam stabilizer, when it inquires wholeheartedly in view of said technical problem Association of the detailed cellular groups in a slurry is promoted, and big air bubbles are formed by the instant. And the frothing agent which carried out [ the frothing agent ] foam breaking and was produced within the mixer by the foaming depressant action of this compound Knowledge that the lightweight plaster board whose reinforcement stops carrying out a recurrence bubble during churning, becomes possible [ obtaining uniform and big air bubbles in a core ], and has an adhesive property over stencil paper, and improved is obtained was acquired, and this invention was completed.

[0008]

[Embodiment of the Invention] Next, the gestalt of desirable operation is mentioned and this invention is explained in more detail. organic system compounds, such as the defoaming agent generally said to the compound which it has set to this invention, and a foam stabilizer means the compound which has the defoaming effectiveness or a foam breaking effect, and has the defoaming effectiveness, i.e., a higher-fatty-acid derivative etc., alcohols, silicone oil, paraffin, etc. -- in addition, the hydraulic matter (gypsum-fibrosum or cement) product completed using these or its scrap wood powder, and pastes are mentioned. Moreover, as a compound which has a foam breaking effect, the sulfate compound of the metal more than divalent [, such as magnesium besides the sulfate compound of the transition metals which make representation the sulfate compound, for example, the manganese, and iron of polyvalent metal, zinc, and aluminum, ] is mentioned. Especially a desirable thing is iron or the sulfate compound of aluminum in these.

[0009] It is possible to control the magnitude of the air bubbles in gypsum slurry in general by adjusting the amount of the foam stabilizer used like \*\*\*\*. Since defoaming capacity or foam breaking capacity surpasses and a lot of frothing agents than before are needed when it is used so much although especially the amount used is not limited Become a cost rise and are not realistic. Generally In the case of a defoaming agent, per exsiccated gypsum 100 weight section, below the 0.5 weight section, in the case of a foam breaker, it is the range below the 1.0 weight section, and in the case of a defoaming agent, it is desirable, in the case of the 0.001 - 0.01 weight section and a foam breaker, is desirable, and is the range of the 0.1 - 0.5 weight section in the case of. furthermore, a frothing agent -- receiving -- per frothing agent 100 weight section -- the case of a defoaming agent -- 0.5 - 50 weight section -- desirable -- the case of the 1.0 - 5.0 weight section and a foam breaker -- the 200 - 5,000 weight section -- it is the range of the 500 - 2,000 weight section preferably.

[0010] in addition, when using the hydraulic matter containing said compound as a foam stabilizer, it comes out not to mention the amount of a compound with the defoaming effectiveness included in it or a foam breaking effect being applicable. moreover, if liquefied when supplying a foam stabilizer in a mixer, it remains as it is --

or it can dilute and, in addition, can supply independently liquefied [ others, such as water, ]. Moreover, when a foam stabilizer is a solid-like, it supposes that it is granular (the detailed thing of the particle size is desirable), and, in addition to powdered materials, such as independent or exsiccated gypsum, can supply in a mixer.

[0011] There is no place which changes substantially with the manufacture approach of the conventional well-known plaster board except the manufacture approach of the plaster board of this invention using the foam stabilizer of the amount of specification as mentioned above. That is, exsiccated gypsum, adhesives, various additives and water, and the bubble at which it foamed beforehand in order to attain lightweight-ization are kneaded by the mixer, and are slushed between the stencil paper of the upper and lower sides of the slurry obtained, and subsequently the briquetting machine which determines thickness and width of face is passed, and it after [ hardening ]-rough-cuts, and a forced-drying machine is cut out through and after an appropriate time at a product dimension, and it is manufactured.

[0012] Like the above, in the thickness of 9.5mm and a consistency 6.8 - 7.2 g/cm<sup>3</sup>, breaking load (N) length / width of the plaster board of this invention which are obtained by carrying out is 485-570/220, and breaking load (N) length / width has the physical properties of 600-650/310 in the thickness of 12.5mm and a consistency 6.6 - 7.0 g/cm<sup>3</sup>. [ 195-220 ] [ 275-310 ] Moreover, in the thickness of 9.5mm and a consistency 6.8 - 7.2 g/cm<sup>3</sup>, punching reinforcement (kgf) and humidity are 25-35, and punching reinforcement (kgf) and humidity have the physical properties of 30-40 in the thickness of 12.5mm and a consistency 6.6 - 7.0 g/cm<sup>3</sup>. The physical-properties value in the above is based on the below-mentioned test method.

[0013]

[Example] Next, an example and the example of a comparison are given and this invention is explained still more concretely.

The slurry which used and kneaded the pin mixer of common use of the foam stabilizer (the defoaming agent or foam breaker) and frothing agent of the following publication, respectively in an example 1 - the 8 exsiccated-gypsum 100 weight section, the water 85 weight section, the water reducing agent 0.3 weight section, the methyl cellulose 1 weight section, and the hardening-accelerator 3.0 weight section was used, and plaster board was manufactured with the conventional method. The breaking load and punching reinforcement of plaster board which were manufactured are shown in the following table 1. The amount of each foam stabilizer used shows the weight section per exsiccated gypsum 100 weight section. In addition, the consistencies of the plaster board which manufactured examples 3 and 4 and examples 7 and 8 although the constituents were the same contents differ. Moreover, foaming of a bubble was performed using the equipment currently indicated by JP,63-45186,A, and each trial obtained and carried out the same air bubbles, respectively.

[0014]

Example 1 Foam stabilizer: Fatty-acid derivative (the Miyoshi Oil & Fat make, trade name Tori Min) The 0.01 weight sections Frothing agent: Alkyl ether sulfate (Toho Chemical make) 0.03 weight sections examples 2 Foam stabilizer: Silicone emulsion (Toshiba Silicone make) The 0.01 weight sections Frothing agent: Alkyl ether sulfate (Toho Chemical make) The 0.03 weight sections [0015]

Example 3 Foam stabilizer: Powder of water-repellent plaster board (\*\* 1) One weight section Frothing agent: Alkyl ether sulfate (Toho Chemical make) The 0.05 weight sections The water repellent in \*\* 1 water-repellence plaster board is a paraffin emulsion, and the amount used is 3 weight sections to the exsiccated gypsum 100 weight section.

Example 4 Foam stabilizer: It is the same as an example 3. Frothing agent: The [0016] as an example 3 [ same ]

Example 5 Foam stabilizer: Sulfuric-acid band (product made from the Daimei Telecom Engineering chemistry) The 0.3 weight sections Frothing agent: Alkyl ether sulfate (Toho Chemical make) 0.05 weight sections examples 6 Foam stabilizer: Ferric sulfate (first class in a reagent) The 0.2 weight sections Frothing agent: Alkyl ether sulfate (Toho Chemical make) The 0.05 weight sections [0017]

Example 7 Foam stabilizer: Ferric sulfate (the Nittetsu Mining make, PORITETSU) The 0.5 weight sections Frothing agent: Alkyl ether sulfate (Toho Chemical make) 0.05 weight sections examples 8 Foam stabilizer: It is the same as an example 7: Frothing agent: The [0018] as an example 7 [ same ] The slurry which kneaded the example 1 of a comparison - the 8 exsiccated-gypsum 100 weight section, the water 85 weight section, the water reducing agent 0.3 weight section, the methyl cellulose 1 weight section, and the hardening-accelerator 3.0 weight section using the pin mixer of common use was used, and plaster board was manufactured based on

the usual manufacture approach. The breaking load and punching reinforcement of plaster board which were manufactured are shown in the following table 1. In addition, in order to obtain a predetermined consistency, the bubble generated using the equipment indicated to JP,63-45186,A like an example, using the alkyl sulfate (Toho Chemical Co., Ltd. make) 0.05 weight section as a frothing agent was mixed.  
[0019]

		厚み (mm)	密度 (g/cm <sup>3</sup> )	曲げ破壊荷重 (N)	押抜強度 (kgf) 乾燥/湿潤 (註2)
実 施 例	1	9.5	0.70	559/210	47/31
	2	9.5	0.68	488/194	41/29
	3	12.5	0.69	645/302	57/37
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	5	9.5	0.75	525/210	43/28
	6	9.5	0.70	455/178	38/23
	7	12.5	0.69	596/245	44/26
	8	12.5	0.66	556/235	41/23

[Table 1] Table 1: Physical property ability

[0020] \*\* 2: Humidity is here as a result of [ after recuperating oneself in view of a general service condition for 3 hours in the room temperature of 25 degrees C, and the ambient atmosphere of 85% of relative humidity ] measurement. In addition, each adhesion with the core and stencil paper in each plaster board of examples 1-8 and the examples 1-8 of a comparison was good. An adhesive trial, "it measured by the adhesive trial specified to JISA6901-1983 gypsum board." Breaking load, "it measured by the bending test specified to JISA6901-1994 gypsum board." Punching reinforcement was measured with the drawing resistance test method of the nail specified to ASTM specification C 473-92 "the standard testing method of the test for physical properties of gypsum board products and a gypsum plasterboard."

[0021] In addition, the SEM photograph (scale factor 100) of the cross section of the plaster board obtained in an example 2, an example 4, an example 6, an example 8, the example 2 of a comparison, the example 4 of a comparison, the example 6 of a comparison, and the example 8 of a comparison was taken, and it was shown in drawing 1 -4. In addition, the cross section of other examples and the example of a comparison was the same as that of drawing 1 -4. It is clear from said table 1 and drawing 1 -4 in a core plaster board's obtained by this invention to have the uniform bubble opening. And in the same specification (thickness, consistency) criteria, it

becomes possible to attain lightweight-ization of a product and to respond to a consumer's needs, reinforcement's etc. improving, and having an adhesive property over stencil paper, and maintaining a physical property.

[0022]

[Effect of the Invention] The lightweight plaster board whose reinforcement according to this invention is not influenced by a class, a mixer to be used of a frothing agent, but stop that detailed air bubbles are intermingled in the core of plaster board as much as possible, make uniform, comparatively big closed cells scattered, and has an adhesive property over stencil paper, and improved was obtained, and it became possible to respond to a consumer's needs.

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[Translation done.]

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] Cellular entering plaster board characterized by intermingling air bubbles and a foam stabilizer in the core material which constitutes plaster board.

[Claim 2] Cellular entering plaster board according to claim 1 whose foam stabilizer is the matter which has the defoaming effectiveness or a foam breaking effect.

[Claim 3] Cellular entering plaster board according to claim 1 whose foam stabilizer is the sulfate compound of polyvalent metal.

[Claim 4] Cellular entering plaster board according to claim 3 whose polyvalent metal is iron or aluminum.

[Claim 5] Cellular entering plaster board according to claim 1 whose amounts of mixture of a foam stabilizer are per [ which constitutes a core material / 0.001 ] exsiccated gypsum 100 weight section - the 1.0 weight sections.

[Claim 6] Cellular entering plaster board according to claim 1 whose amount of mixture of a foam stabilizer is the range per [ 0.5 ] frothing agent 100 weight section - of the 5,000 weight sections.

[Claim 7] Cellular entering plaster board according to claim 1 breaking load (N) length / whose width is 485-570/220 in the thickness of 9.5mm and a consistency 6.8 - 7.2 g/cm<sup>3</sup> and whose breaking load (N) length / width are 600-650/310 in the thickness of 12.5mm and a consistency 6.6 - 7.0 g/cm<sup>3</sup>. [ 195-220 ] [ 275-310 ]

[Claim 8] Cellular entering plaster board according to claim 1 punching reinforcement (kgf) and whose humidity are 25-35 in 3 the thickness of 9.5mm, and the consistency of 6.8-7.2g/cm and whose punching reinforcement (kgf) and humidity are 30-40 in the thickness of 12.5mm and a consistency 6.6 - 7.0 g/cm<sup>3</sup>.

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[Translation done.]